Unmanned Ships

Oskar Levander, VP Innovation, Rolls-Royce Marine
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Digitalisation

- Everything Connected to Everything – Everywhere, all the time
- Internet of Things
- Industry 4.0
- Consumer market leading the way
- Internet trade dominated by international companies
- New business opportunities and players
  - Amazon, Airbnb, Uber, Spotify,..
- Data = value
Information Technology

The dawn of the Ship Intelligence era
Ship Intelligence

REMOTE CONTROL/OPERATION
- Monitoring & Control
- Navigation & Piloting
- Operation of payload systems

DECISION SUPPORT
- Navigation (e.g. Routing)
- Situational awareness
- Collision avoidance
- Safety support

NAVIGATION & POSITIONING
- Situation awareness & Sensing
- Dynamic Positioning & Auto pilot
- E-Navigation

CONDITION MANAGEMENT
- Health monitoring
- Self diagnostics
- Smart maintenance schemes
- Remote support
- Maintenance robots

OPERATIONS OPTIMISATION
- Onboard energy optimisation
- Fleet optimisation
- Revenue optimisation

ONBOARD AUTOMATION
- Automatic reporting
- Automatic systems (e.g. Mooring)
- Robotics
- Full autonomous operation
Unified Bridge
Unified Bridge

Common look and feel
Connectivity

ANALYSIS

MONITORING

USE DATA
Energy Management

Onboard ship performance monitoring

Customer web portals

Shore-side support and optimisation services
Equipment and System Health Monitoring
Intelligent ship today

- Decision support
- Weather routing
- Onboard optimization
  (energy, power management, etc.)
- Condition based maintenance
- EHM on main components
- Ship sensors
- Fleet monitoring
- E-Navigation
- AIS
- ECDIS
- Common controls
Intelligent ship tomorrow

- Remote control
- Autonomous operation

- E-Navigation
- AIS
- ECDIS

- Common automation standard and user interface

- Fully sensored (ship awareness), feedback to operator
- EHM on all ship systems (machinery, ship systems, payload systems,..)
- Predictive maintenance
- Remote expert support

- Fleet optimization for best profit
  Total fleet routing
  (revenue (cargo), weather, current, ship performance, bunker prices, maintenance schedules)

- Decision support
  (collision avoidance, risk mitigation, emergency reaction)

- Automatic mooring
  Automatic cargo handling and optimization

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Unmanned Remote Controlled Ships

Making ship transport more efficient and safe!
Remote Controlled Ships

• Reduced crew costs
• Access to competent crew
• Better working conditions
• Improved ship efficiency
• Improved safety
Unmanned Trend in Society

It is not IF, but WHEN...
Marine is only following today's trend!
Crew Trends

Crew size for ocean going ships

Number of crew

1850 1900 1950 2000 2050

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Crew Competence

How to best utilise the skills of the crew?

• What is the core skill of the crew vs. what do they spend their time doing?
Remote Operation Center
Remote Operations

• Better working environment
  - Safe
  - Comfortable
  - Close to family and friends

• Attract young people to shipping
Remote Controlled Ships - Features

No deck house

More cargo

New possibilities
  - New layouts
  - Rethinking the ship design

Lower costs

No hotel systems
  - Water production
  - Water heating
  - AC
  - Sewage treatment
  - Etc…

Communications

Redundant machinery

Lower power demand
  - Lower resistance from reduced LWT
  - Lower hotel load
  - Etc…

New level of Automation

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Remote Control or Autonomous?

Remote control
• Port operations
• Navigation in congested areas
• Advanced manoeuvring situations
• ...

Autonomous operation
• Navigation at open sea
• Total ship traffic overview
• Route and speed optimisation
• ...

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Key Development Areas

- Cyber Security
- Communications
- Operation optimization
- Remote control center
- Remote controlled systems
- Situational awareness systems
- Health & safety management
Safety

As safe or safer than a conventional ships!

• New technology to aid the navigation of ships
• Avoid human errors
• Redundant systems with predictive health management

Unmanned operation is not suited for all types of ships
Safety

What is safer?

• 20 persons onboard a vessel in the North Sea in a raging storm, or
• 2 persons in a control room on land?
Piracy

• Unmanned ships
  • easier to protect
  • more difficult to take control over

• No hostages

• Cyber security is vital
It is Not Black or White

• Remote control does not necessarily mean unmanned
• Onboard crew can focus value adding tasks and safety
  - Potential to reduced number of crew
• Automation ensure safer and optimised performance
International Regulatory Obstacles

Examples of conflicts with present international rules and regulations

SOLAS Ch. IV 12
COLREG Pt. A-B
SUA Art.3-8
Load lines Ax. 1
GMDDS, Ship Registration Convention
ISPS code
SOLAS Ch.V Reg 11, 14, 22, 33, 44, ...
STCW Ch.III
ILO C179-180
UNCLOS Art. 94, ISM Code, SALVAGE Ch.2

REISSUE 2024?
Unmanned ships will most likely start with local applications!
Towards Unmanned

- Ship Intelligence will provide the means to make ships more efficient and leaner.
- Remote support and operation combined with increased level of automation will reduce the number of crew required.
First Movers - Unmanned Ferry
Unmanned Battery Ferry Concept
AAWA — Advanced Autonomous Waterborne Applications
Conclusions

We are at the dawn of the Ship Intelligence era

Unmanned ships will be the most fundamental change in shipping that we will experience
"The best way to predict the future is to create the future"